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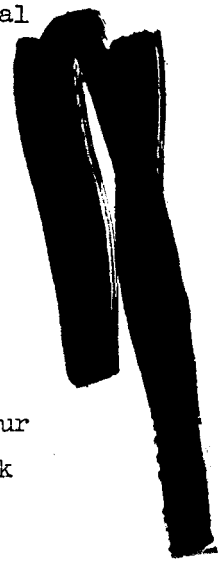
The occurrence of areas in the central nervous system without blood brain barrier is well known; the area postrema, epifisis, supra-optic crest choroid plexuses, subfornic organ, neurohypophisis are among them. All these regions of the nervous system usually called "special" or "non-protected" areas have metabolic, histochemical or structural features clearly distinctive from the conventional nervous tissue. This fact induced us to investigate if the blood tissue barrier mechanism of glycogen body of the lumbo sacral spinal cord of birds, was present or not, since this organ has a "sui-generis" structure and histochemistry. It is in fact almost exclusively composed of glial cells specialized in glycogen storage. The glial nature of these cells was first asserted from the anatomical standpoint (Terni, 1925); this has been confirmed for its neuroectodermic origin (Watterson 1949) and because its reactivity against pathogenic agents in the sense of the differentiation of glial fibers (de Estable et al. 1962, 1963).

On the other hand, it is known that this type of cell is present outside the glycogen body, in the Koelliker ganglion of the avian spinal cord where is practically the only glial type of cell and "works" as a perineuronal satellite. (Kolliker 1901, 1902; Terni 1924, Estable, et al. 1960). Studies done by us (Estable-Puig, et al. 1963) with vital stains and sodium fluorescein, demonstrated that their solutions did not penetrate the glycogen body when they were given intravenously and that they did pass through, when they were put in the subarachnoid space by way of coxigeal puncture of the spinal canal. (Fig. 2, 3, 4). These results were interpreted as indicative of the occurrence of a mechanism of hemato-textural barrier in such organ. The interest of such finding

is founded in the fact that in the glycogen body, there are no neuron bodies or their dendrites or axons, no myelin sheets, neither oligodendroglia or microglia, no astrocytic sucker feet, no neuropyl. However, there is a barrier mechanism.

The hypothesis that we think better explain this phenomenon, is that so clearly stated by R. Edstrom (1958) in the sense that the almost absolute absence of intercellular space is the major anatomical factor that accounts for the restricted transport from blood to nervous tissue. Actually, despite the big structural differences, the glycogen body has several features in common with the proper nervous tissue, i.e.: its neuroectodermal origin and the lack of intercellular spaces. This can be established without the help of the electron microscope as the spheroid or polyhedric shape of the glycogen storing cells demonstrates it clearly (Figs. 6 and 7). On the other hand, this extracellular space is, thanks to the absence of processes in these cells smaller than that of an equal volume of conventional nervous tissue.



At present we are doing a detailed light and electron microscopic study of the relations between the glycogenic cells and the vessels. After hearing Dr. Davson's presentation, we will take into account the possibility that the intercellular space could be fractioned in two different compartments, being sceptics, however, as no glial membrane like that of the sucker foot seems to be present around the vessels.

Dr. Friede: "In regard to Dr. Estable-Puig's observations on the avian glycogen body, I would like to mention some recent work done in our laboratories on the enzyme histochemistry of this structure. This work is still in progress, but our data suggests that the glycogen-storing cells of the avian glycogen body have an intense reaction for lactic dehydrogenase and DPN-diaphorase, but little or no reaction for succinic dehydrogenase and cytochrome oxidase. This would seem to suggest that the cells - which are highly specialized for glycogen metabolism - utilize glycolysis to a relatively great extent, but have little potential for utilizing the citric acid cycle".

Dr. Friede's enzymologic findings are most interesting and stress the metabolic differences that exist between the "glycogliocites" and the astrocytes of the conventional nervous tissue. The scarce reactivity for succindehydrogenase and cytochromoxidase and consequently little potential for utilizing the Krebs cycle is in agreement with the scarce number of mitochondria present in these glycogenic cells as has been shown by the Electron Microscope (Revel, et al. 1960) and corroborated by us.

However, a similar study of the Glycoglgiocites of the Kolliker nuclei would be interesting. Here these cells are surrounding big multipolar neurons apparently like satellites. At the same time, it is probable that the enzymatic "set" could change in pathological conditions. In fact the glycogliocites exhibit a fibrilar component in different pathological conditions that have been interpreted as gliofibrillar differentiation.

LEGENDES

FIGURE 1: Histological section of the chicken spinal canal at the level of the blycogen body. In the upper section, this body is well stained, in the inferior part, there is a negative staining after the amylase digestion of the glycogen.

FIGURE 2: Chicken lumbosacral region of the spinal cord. Spinal cord and glycogen body, 24 hours after intraperitoneal inoculation of Trypan Blue solution. Notice the deep coloration of soft tissues, kidney and bone, but the glycogen body and the rest of the spinal cord remain unstained.

FIGURE 3: Similar preparation as Figure 2: The animal received intraperitoneal inoculation of sodium fluorescein 15 minutes previous to sacrificing. Ultraviolet picture shows the fluorescence in soft tissue and in bone but none in the glycogen body.

FIGURE 4: Similar to Figure 2 and 3, the animal in this case received a coxigeal inoculation of sodium fluorescein. Ultraviolet light picture. Notice the intense fluorescence of the spinal cord and the glycogen body.

FIGURE 5: Schema of the different intercellular fluid in the central nervous system to be compared with different organs. Reproduced from Acta Neurologica Scandinavica with Dr. R. Edstrom and their authorization.

FIGURE 6: Mycrograph of the glycogen body. PAS stain shows the glycogen content of the glial cells that compose this organ. Glycogen has a deep stain but the nuclei and the cellular membranes appear negative. The intercellular space is reduced to a minimum and is represented by the mosaic pattern in between the PAS positive accumules.

FIGURE 7: Similar section to the anterior. PAS and hematoxilin after amylase digestion which inhibit the stain of the glycogen.

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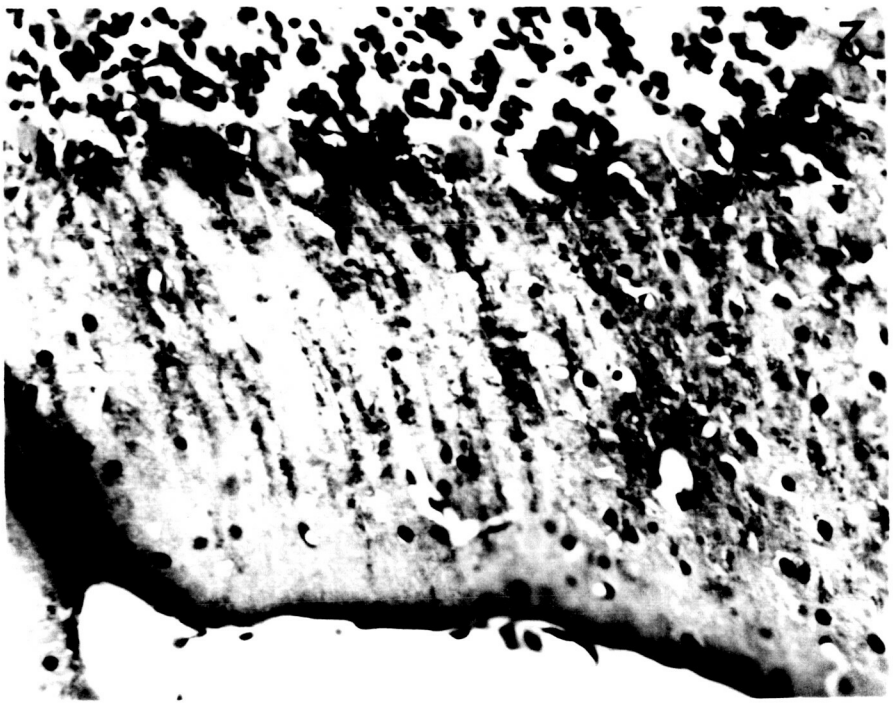
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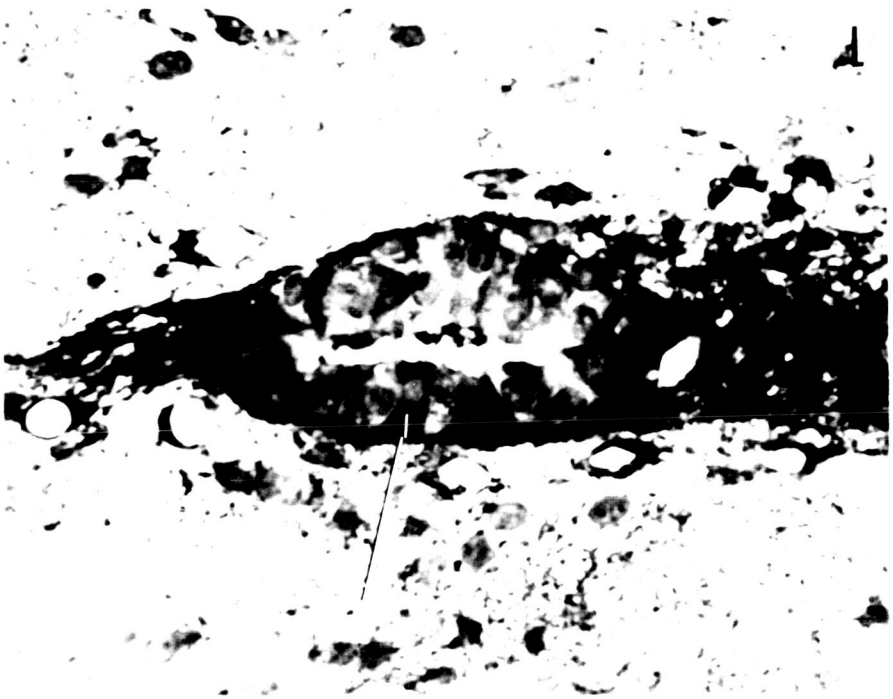
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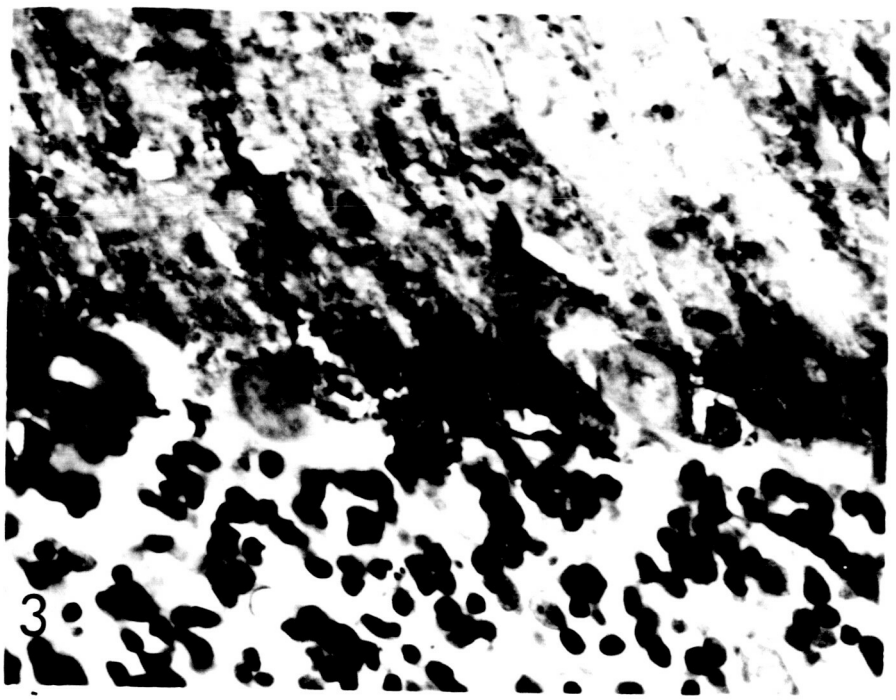
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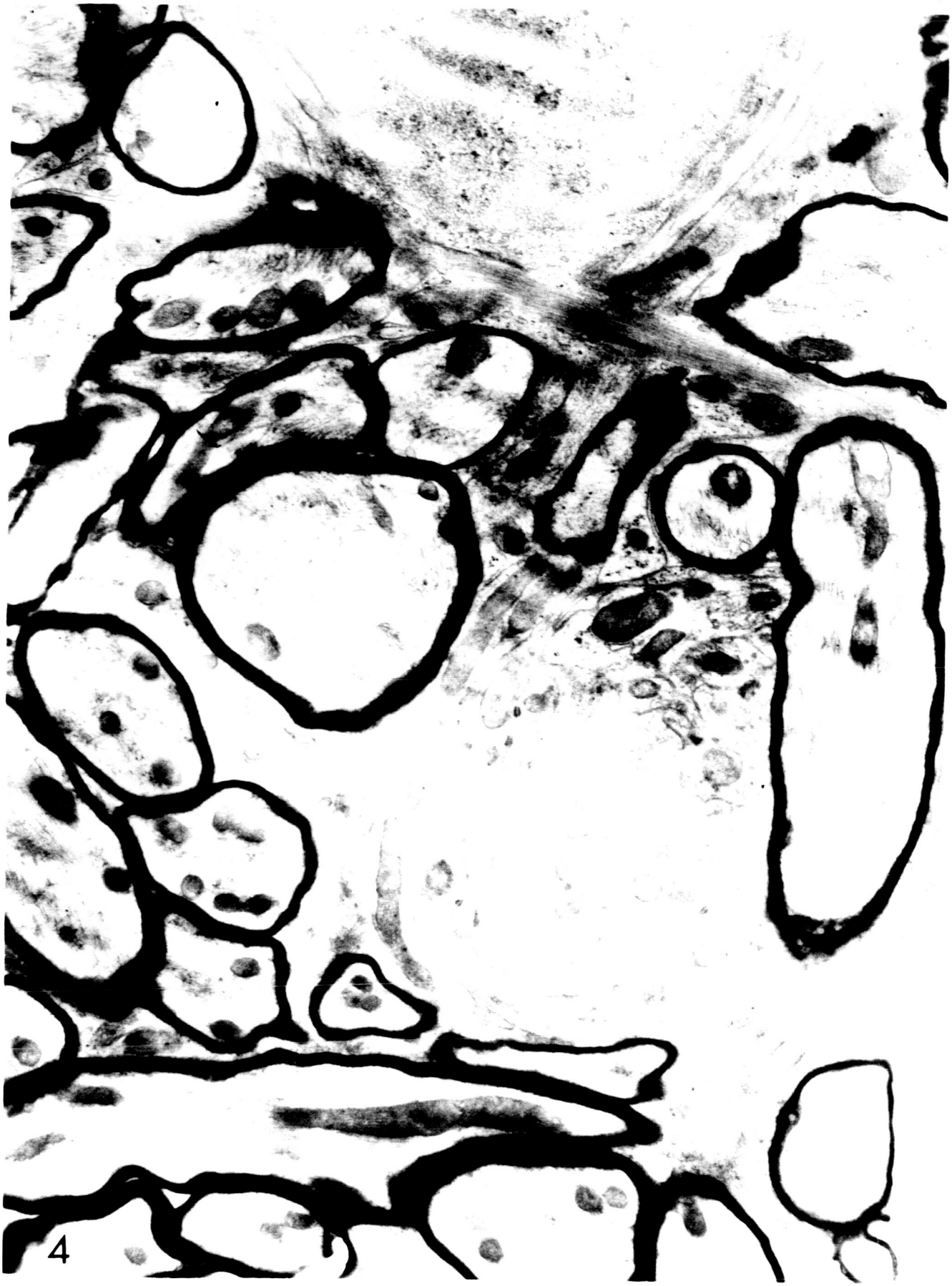

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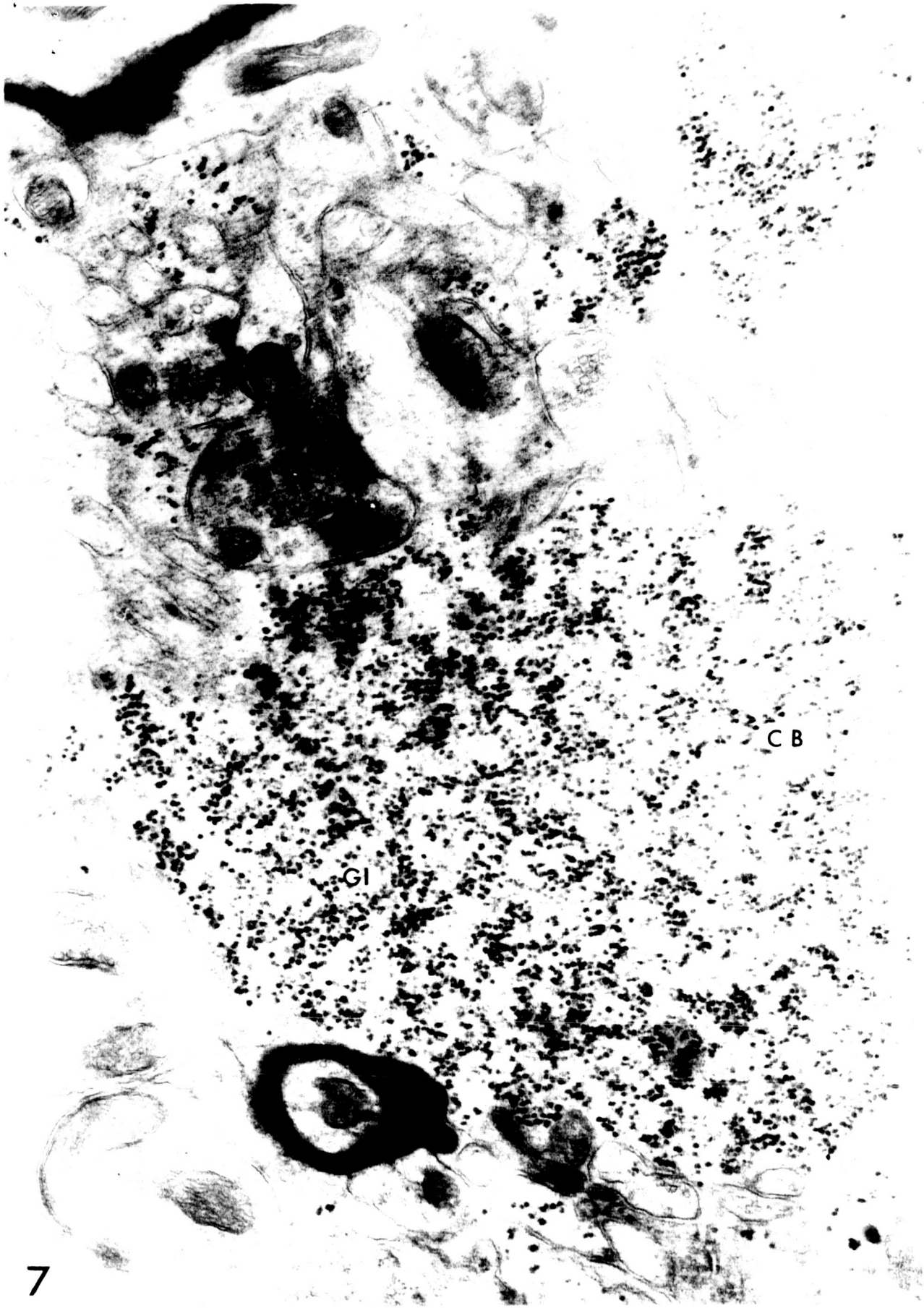

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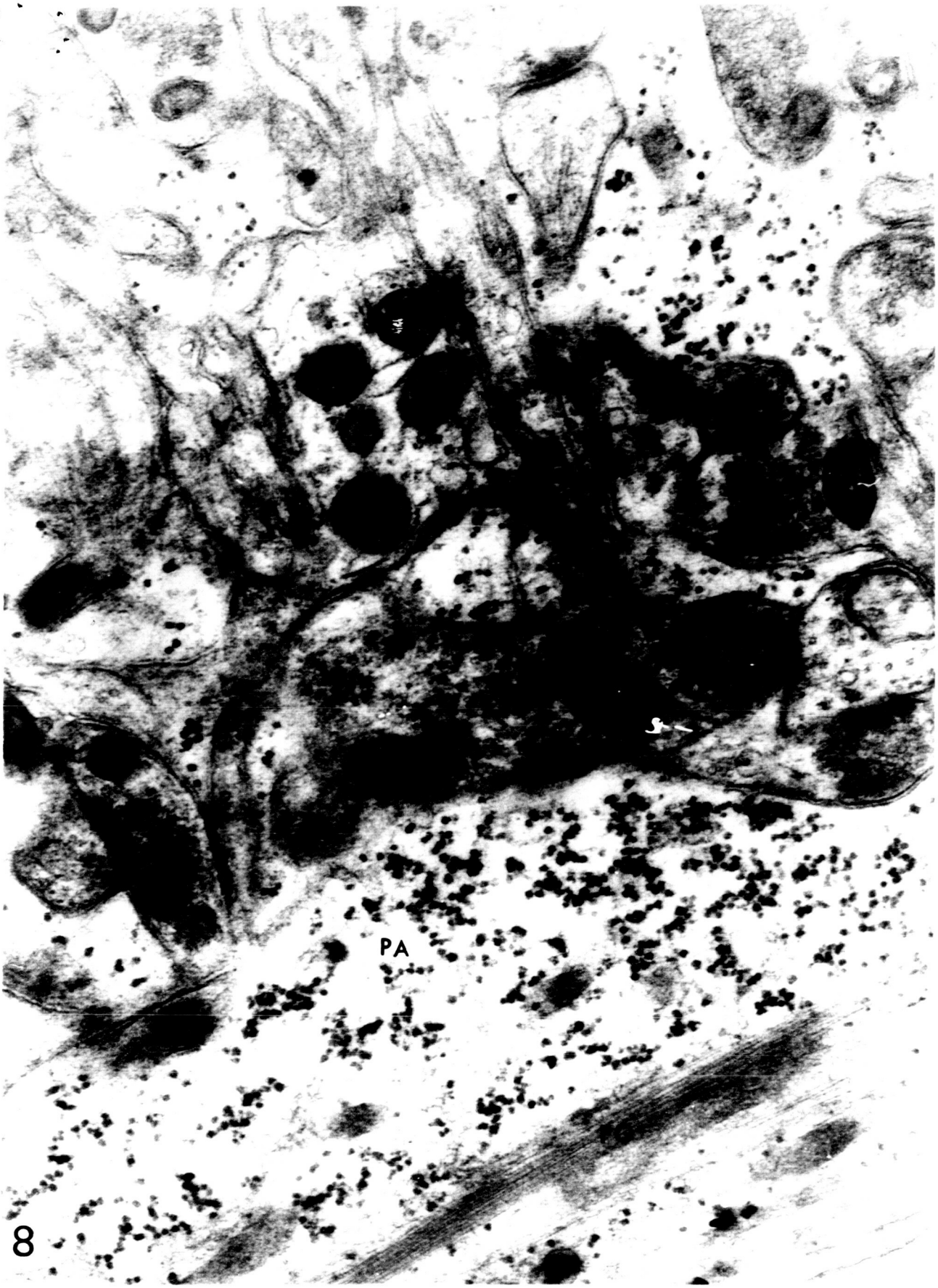

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